

Amendments to the Specification

Please replace the paragraph beginning on page 2, line 21 and ending on page 3, line 16 with the following rewritten paragraph:

On the transmitter side of the communication channel, the analog signal has a baseband bandwidth of $\pm f$ and is converted to n bit data words by the analog to digital converter at a sampling rate exceeding the Nyquist rate of $2f$ samples per second. These n bit data words are parallel data bit signals that are converted into a serial bit stream at a rate of $2fn$ bps. To determine the ordering of the least to most significant bits of the data words in the serial bit stream, unique and easily identifiable synchronization frame words are periodically inserted into the serial data stream. These synchronization frames words are overhead data and are typically one to ten percent of the informational data words. This overhead data increases the required rate of bits transmitted per second to $(2fn(1+s/100))$ bps where s is the percentage of the serial bit stream associated with synchronization frame words. To accomplish the communications at the original data bit, the serial stream including the frame words and redundant error correction bits must be reclocked to a higher data rate having a shorter bit duration time. In order to maintain the data rate of the data words when the serial bit stream has additional synchronization frame words, the serial bit stream will be clocked at a higher rate. The received data stream must also therefore be coherently reclocked to recover the original data. Non-integer multiples of the transmitted data require frequency synthesizers and other digital word buffers.

1 Please replace the paragraph beginning on page 6, line 1 and ending
2 on page 8, line 22 with the following rewritten paragraph:

3 Referring to Figures 1A and 1B, first and second order
4 modulators have been used to modulate an analog input signal 10
5 into a modulated output 12. The output 12 is a binary output. In
6 the first order sigma delta modulator of Figure 1A. ~~The,~~ the input
7 signal ~~in~~ is fed into a summer 14 providing an input error signal
8 that is fed into an integrated 16. The input error signal from the
9 summer 14 is integrated by the integrator 16 to form an accumulated
10 error signal that becomes an input to a one bit ~~quantifier~~
11 quantizer 18. The output of the one bit quantizer 18 is the binary
12 output 12 and is the sign of accumulated error signal. The output
13 of the quantizer 18 is fed into the DAC 20 providing a converted
14 error equal to a gain amplifier 22. A gain amplifier 22 provides
15 gain G of the converted error signal from output of the DAC 20 to
16 provide an amplified error signal to the summer 14. The amplified
17 error signal output of the gain amplifier 22 is fed back into the
18 summer 14 to be subtracted from the analog input signal 10 to
19 provide an input error signal. Hence, the first order modulator
20 comprises a first order feedback loop. The first order feedback
21 loop forces the average of the converted error signal output of the
22 DAC 20 to be equal to the analog input signal 10 plus an error
23 signal. The output of the first order modulator 12 is a series of
24 +1 or -1 pulses of varying duration. The second order modulator of
25 Figure 1B, comprises a first order feedback loop and a second order
26 feedback loop. The second order feedback loop comprises a summer
27 14a, integrator 16a, a the one bit quantizer 18, a DAC 20a, and a
28 gain amplifier 22a, whereas the first order feedback loop comprises

1 a summer 14b, integrator 16b, the one bit quantizer 18, a DAC 20b,
2 and a gain amplifier 22b. The first order feedback loop serves to
3 generate a first order input error signal at summer 14b, while the
4 second order feedback loop serves to generate a second order input
5 error signal of first order input error signal. The presence of a
6 second order feedback loop reduces the magnitude of the overall
7 error at the binary output 12. The binary output 12 of the sigma
8 delta modulator is a series of pulses of +1 or -1 of varying
9 duration. Hence, the sigma delta modulators convert the analog
10 input 10 into the binary output 12. The sigma delta modulators
11 have been used as modulators for digital communications, and as
12 part of an analog to digital converter. These sigma delta
13 modulators have been used in analog to digital converters
14 comprising a sigma delta modulator and a digital filter. These
15 sigma delta modulators have also been ~~to~~ used as opposing
16 modulators and demodulators in communication links for
17 communicating an analog signal by transmitting a binary
18 communication signal through the crosslink. In the sigma delta
19 analog-to-digital converter, the sigma delta modulator and digital
20 interpolating filter are an integrated package. While sigma delta
21 modulators offer analog signal modulation, these modulators have
22 not been used for laser crosslink communication where digital
23 signal samples rather than analog samples are desired. These and
24 other disadvantages are solved or reduced using the invention.

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1 Please replace the paragraph beginning on page 11, line 14 and
2 ending on page 12, line 9 with the following rewritten paragraph:

3 The laser crosslink is well suited for use in small satellites
4 such as nanosatellites having very limited power resources. The
5 laser crosslink has a reduced number of components reducing power
6 requirements. One application of small satellites is a signal
7 receiver that transmits digitized copies of the received signals to
8 other satellites for processing. This has uses in either signal
9 intelligence or for digital nonregenerative transponders. The laser
10 crosslink offers lower power consumption and fewer parts by
11 integrating a modulator and A/D converter with the transmitter and
12 receiver. The laser crosslink reduces filter requirements for small
13 satellites using direct modulation of a laser while reducing
14 manufacturing tolerances for smaller satellites . No specialized
15 modulator is required by the laser. No error correction is required
16 because redundancy is added by the over sampling of the sigma delta
17 converter. No synchronization is needed between the two satellites
18 because the output of the digital filter may be sampled at any time
19 to reconstruct signal samples. No framing is needed in the data
20 stream because the data stream is self-synchronizing. Also, there
21 is no need to order bits from most to least significant bits as in
22 traditional digital data links because only the duration of the bit
23 time is required for proper data detection. These and other
24 advantages will become more apparent from the following detailed
25 description of the preferred embodiment.

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1 Please replace the paragraph beginning on page 18, line 1 and
2 ending on page 18, line 10 with the following rewritten paragraph:

3 The laser communication crosslink system is preferably used
4 for communicating analog signals in digital form. The laser
5 communication crosslink system need not use parallel to serial
6 conversion, frame synchronization, data reclocking, nor forward
7 error correction. An analog signal may be communicated over the
8 communication medium in digital form for recovering a digital value
9 of the analog signal. Those skilled in the art can make
10 enhancements, improvements, and modifications to the invention, and
11 these enhancements, improvements, and modifications may nonetheless
12 fall within the spirit and scope of the following claims.

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